Otomys Jacksoni, sp. n.

Allied to *O. irroratus*, Bts., but with two deep grooves down each lower incisor instead of only one. Basal length of skull 31·4 millim.

Hab. Mount Elgon, 13,000 feet. Coll. F. J. Jackson, Esq.

Rhizomys annectens, sp. n.

Intermediate in size between *R. macrocephalus* and *R. splendens*; externally very similar to both. Basal length of skull 51 millim., as compared to 63 in the first, and 41 in the second of the allied species.

Hab. Either Masai-land or inland British East Africa. Coll. F. J. Jackson, Esq.

Cervicapra Clarkei, sp. n.

Smaller than *C. bohor*, Rüpp., but the horns longer, slenderer, and less curved. Skull light and delicate, flattened from above downwards; lacrymal fossæ present, although very shallow; lower jaw excessively weak and slender.

Length of skull (occiput to gnathion) 210 millim.; height (crown to angle of lower jaw) 94 millim.; length of horn, round curve, anteriorly, 245 millim.

Hab. Northern Somali-land. Coll. T. W. H. Clarke, Esq.

New Researches on the Spores of Myxosporidia (Structure and Development)[*]. By M. P. Thélohan.

At the present time we possess but very few definite notions as to the phenomena of sporulation in Myxosporidia. The observations made by Balbiani [†], Bütschli [‡], and Gabriel [§] have, it is true, determined the general course of the development of the spores; but many details yet remain to be elucidated, especially with reference to the development of the polar capsules.

We know that the nuclei of Myxosporidia are localized in the endosarc, where they exist in very large numbers. The first stage of the formation of spores consists in the differentiation around one of these nuclei of a little sharply-defined sphere of plasma, which appears to be encased in a delicate envelope resulting from the condensation of the peripheral layer.

We next observe this nucleus divide by karyokinesis. I have seen, among other figures, a spindle with absolutely typical equatorial plate, so that not the slightest doubt could exist.

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[*] Carried out at the laboratory of Prof. Balbiani, at the Collège de France.

[†] Balbiani, 'Leçons sur les Sporozoaires,' 1884.

[‡] Bütschli, "Beiträge zur Kenntniss der Fischpsorospermien," Zeitschrift für wiss. Zool. 1881; Bronn's Thier-Reich, Bd. i., Protozoa.

[§] Gabriel, Berichte der schles. Gesellsch. f. d. J. 1879.

The little sphere of plasma then exhibits two nuclei; as these continue to divide, we soon have a sphere containing some ten of them. The sphere itself next segments into two secondary masses or sporoblasts, which remain united by the envelope of the primary sphere. Each of these incloses a certain number of nuclei; we shall see further on that my observations do not permit me to determine whether the number is in reality four or only three, as was found by Bütschli.

However this may be, the nuclei which do not enter into the constitution of the sporoblasts remain unemployed, and we subsequently find them in a little mass of plasma which persists at the side of the sporoblasts within the envelope of the primitive sphere.

We now have to consider the phenomena presented by the sporoblast up to the complete formation of the spore.

We first see the plasma (in the forms with two polar capsules) divide into three little unequal masses, two smaller and one larger, as has already been described by Balbiani and Bütschli. In the two former the polar capsules will take their origin; the third will become the plasmic mass of the spore. Each of the smaller masses contains a nucleus, and before long we see, usually in the neighbourhood of this nucleus, a little rounded vacuole arise, which appears like a clear space and is distinguished from the plasma by the absence of granulations. At some point of the wall of the vacuole there arises a kind of little bud of protoplasm, which grows out into the vacuole, driving back round its sides the substance with which the vacuole is filled; in this way after a certain time we get a little pyriform body surrounded by a clear stratum, formed by the contents of the vacuole, and united by a sort of pedicle with the remainder of the plasma, from which it does not differ in the least in appearance. The pedicle is gradually constricted, and the little pyriform body soon becomes free; meantime it has become surrounded by a membrane, and a filament has developed in its interior. The latter clearly arises from the protoplasm of the bud; but I have not been able to follow the process of its formation.

Around the polar capsule which has thus been formed we find the remains of the globule of protoplasm which gave it birth and the nucleus which the latter contained. The nucleus in most cases remains attached to the capsule; but sometimes it may separate from it and be included in the plasmic mass of the ripe spore. In a previous paper * I had considered these nuclei as belonging to the latter, and had assigned to them a different origin; the study of their evolution and especially the use of better methods now enable me to rectify my mistake and give to the facts their true signification.

The polar capsules during their formation have no fixed direction; it is not until later on that they orientate themselves and take up their definite position.

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* Thélohan, "Sur la constitution des spores des Myxosporidies," Comptes Rendus, December 9, 1889; "Contributions à l'étude des Myxosporidies," Annales de Micrographie, February 1890.

As for the third mass which was formed within the sporoblast, it is destined to furnish the plasma of the spore; at a very early stage we find in it two nuclei generally close together, which persist until maturity. Now did these two nuclei preexist within the sporoblast, which in that case would primarily contain four of them, or do they result from the division of a single nucleus, as must be the case if we admit with Bütschli that the sporoblast contains three nuclei only? This is the point which my observations have not enabled me to determine.

Up to this point the spores are rounded or oblong; they lose no time in assuming their final shape by surrounding themselves with an envelope, the origin of which has unfortunately escaped me. In the tailed spores the tail is at first bent back on one side of the spore, and remains in this position until the rupture of the envelope of the primitive sphere, which persists for a tolerably long time.

It is not unusual, especially in the tench, to meet with spores with from three to eight capsules. I have always found a nucleus corresponding with each one of these; their formation therefore probably takes place in the usual way. In this case the sporoblast must without doubt have contained an abnormal number of nuclei; sometimes indeed it seems probable that a single spore is formed at the expense of the primitive sphere.

In conclusion, we may sum up the chief results of my investigations as follows:—

1. The nucleus of Myxosporidia divides by karyokinesis.

2. The polar capsules are formed at the expense of little masses of plasma, which are differentiated within the sporoblast and contain a nucleus; the process of their formation presents many points of analogy with that which has been observed by Bedot[*] in the nematoblasts of species of *Velella* and *Physalia*.

3. The plasmic mass of the spore is derived from another portion of the sporoblast; it contains two nuclei and a vacuole with contents stainable reddish brown by iodine, the existence of which I have already described, and the presence or absence of which is constant in the same form.—*Comptes Rendus*, cxi. (Nov. 1890), pp. 692–695.

On the Sense of Smell in Starfish. By M. Henri Prouho.

It is a legitimate conclusion from our knowledge of the anatomy of Starfish that the sense of sight is not sufficiently developed in these animals to enable them to distinguish and come up with their prey, and we are naturally led to admit that the sense of smell is their sole guide in the search for food. Nevertheless I have thought it worth while to render our knowledge of this subject more certain, by means of a few experiments directed towards the following points:—(1) observing how the behaviour of a Starfish is affected by the conditions under which prey is offered to it; (2) demonstrating the uselessness of the organ of vision in the search for food; (3) determining whether the sense of smell is diffused or

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[*] Bedot, "Recherches sur les cellules urticantes," Recueil zoologique Suisse, 1888.